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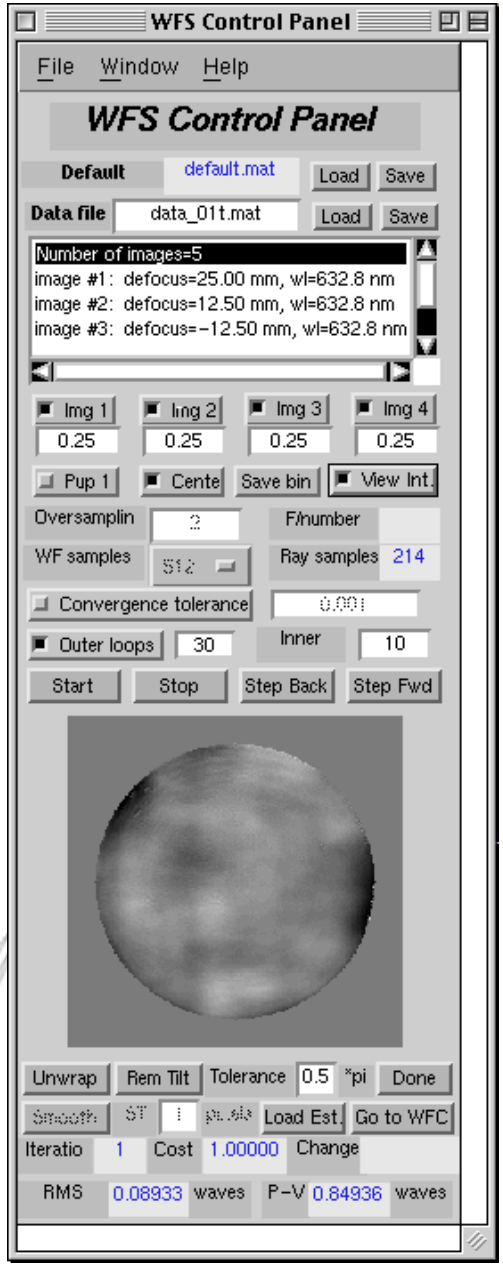
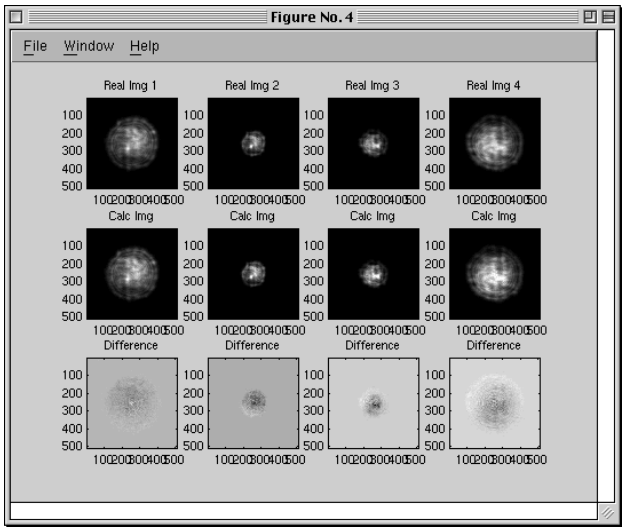
**These slides summarize performance results obtained in the Source/Simulator/WF Sensor Configuration of DCATT**

**They demonstrate excellent performance in the final, Fine Phasing control mode**

**Overall performance substantially exceeds DCATT requirements of $\lambda/20$ at 2 $\mu$m wavelength**

# Wavefront Sensing Performance Summary




- **WFsensing Repeatibility**
  - **RMS for 10 estimates = λ/100 at λ = 6328 Å, 3 nm bandwidth**
- **Bandwidth sensitivity**
  - **RMS = λ/40 at λ = 6328 Å, 40 nm bandwidth**
- **Wavelength sensitivity**
  - **Δ RMS = 6 nm, λ = 5140, 6328, 7945 Å**
- **Insensitive to pupil intensity profile variations when pupil image used in processing**
- **Comparison to Zygo within Zygo error bar**

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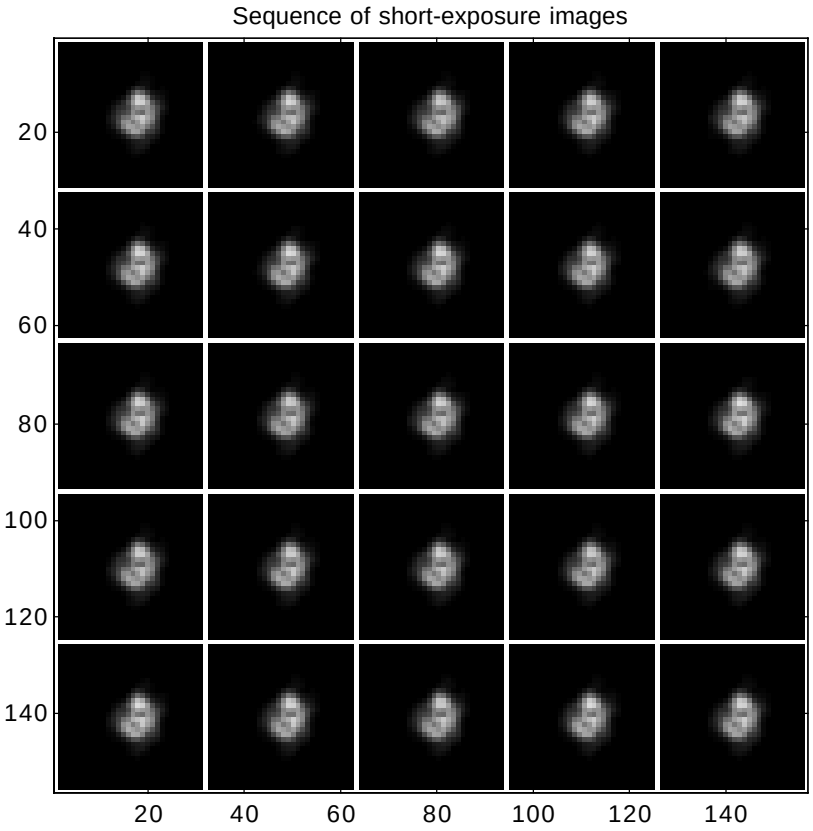
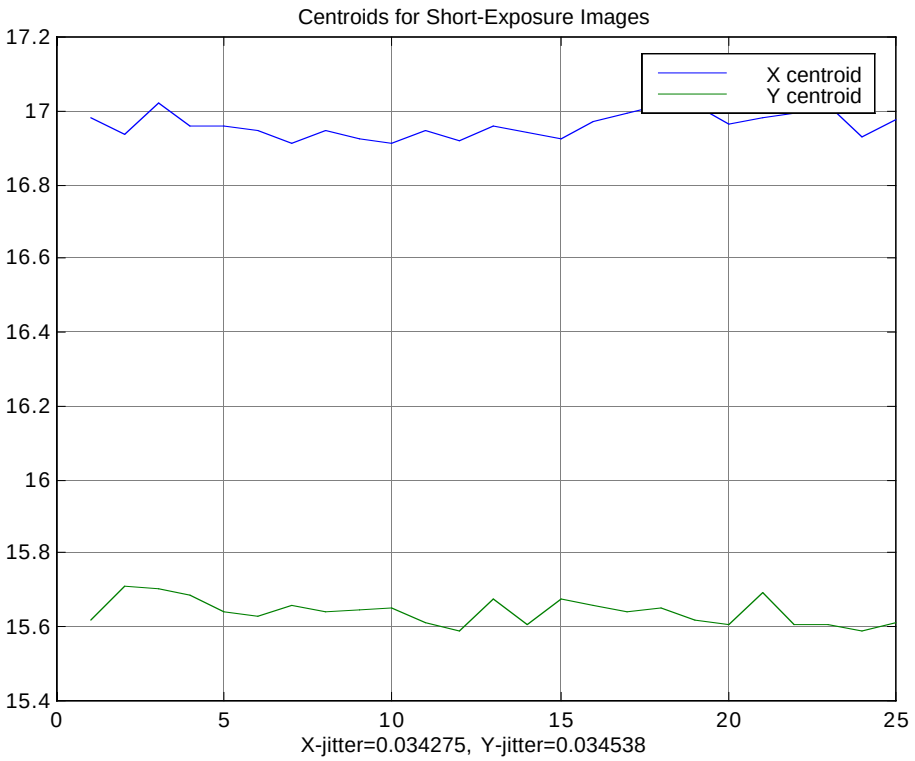
# Jitter Performance




- Sequence of short (0.1 sec) exposure defocussed images, laser source
- Combined lab seeing, acoustic and seismic noise sources
- These results with enclosed optics
  - RMS = 1/30 pixel
  - Peak-to-valley = 1/10 pixel

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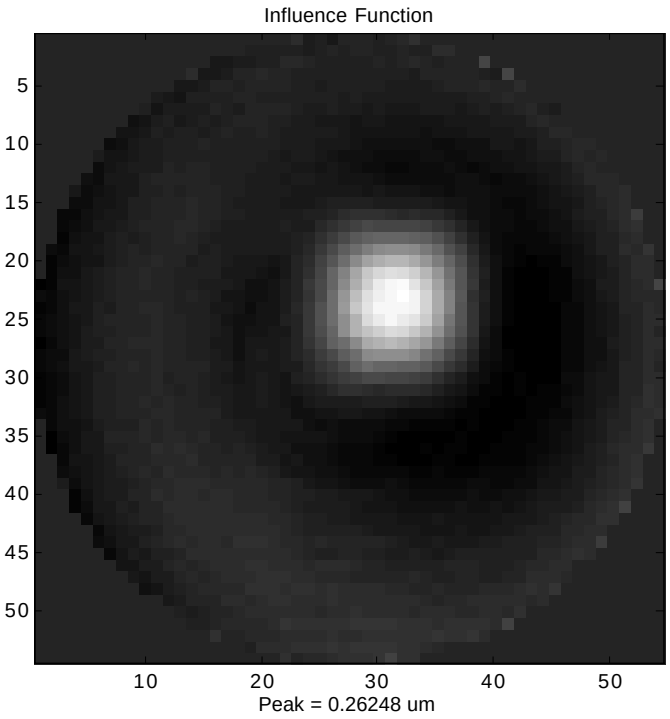
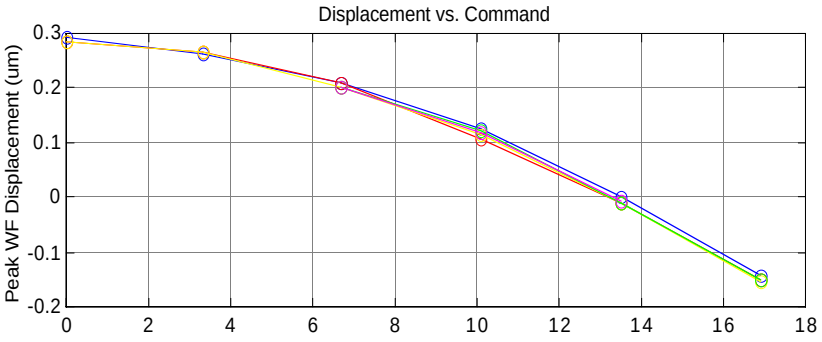
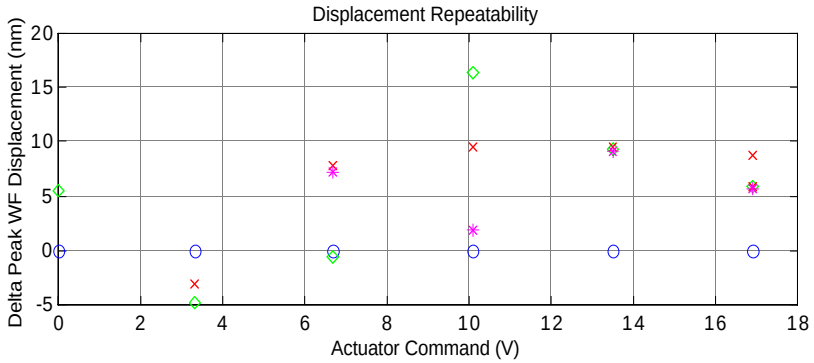
# Deformable Mirror Performance




- Simulator DM is used as an aberrator and a controller, with 52 active actuators
- AO DM will have 349 actuators
- SDM calibrated using WF sensor
- Typical influence function shown
- SDM displacement vs. command curve shows actuation error peak at 16 nm, standard deviation about 5 nm

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# Performance Summary

- WF Sensing
  - RMS WF Sensing repeatability < λ/100 at λ = 6328 Å, 3 nm bandwidth, small aberrations
  - WFS bandwidth sensitivity
    - RMS WFSE < λ/40 at λ = 6328 Å, 40 nm bandwidth
  - WFS wavelength sensitivity
    - RMS WFSE < 6 nm, λ = 5140, 6328, 7945 Å
  - Insensitive to pupil intensity profile variations when pupil image used in processing
  - Comparison to Zygo within Zygo error bar
- WF Control
  - Best flat WFE = λ/36 at λ = 6328 Å
  - Limited by (in order):
    - OAP figure errors beyond DM spatial frequency cutoff
    - DM actuation nonlinearity and hysteresis
    - Dead actuator
    - WF sensing error

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